The Role of "Office of Patient Experience" on Experiential Outcomes in U.S. Hospitals: An Empirical Study

Thesis

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Abstract

Since the inception of the Patient Protection and Affordable Care Act (PPACA), there has been a drastic change in the delivery of healthcare. Payment reform was one of the key attributes of the PPACA, shifting the reimbursement model from fee-for-service to value based purchasing (VBP). In the VBP model, payments are bundled and reimbursement is based on a VBP score. The VBP score is comprised of 70% process management (Quality & Safety) and 30% patient experience during their hospital stay. Patient experience is measured by the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) score. These measures are quantifiable and beginning FY2013, the Centers for Medicare and Medicaid began using the HCAHPS survey to determine reimbursement rates as part of VBP model. Since patient experience has become a vital component of the reimbursement model, hospitals are taking initiatives to improve this patient experience dimension and raise their scores on HCAHPS surveys. One such change is the emergence of "Office of Patient Experience" (OPE) as an independent governing entity responsible for improving patient experience and satisfaction. In this multi-year observational study, we hope to gain insights on the role of such offices across all hospitals in the U.S. and their effects on experiential outcomes *in silico*. We find that hospitals with OPEs perform better than hospitals without OPEs on six of the ten dimensions of the HCAHPS survey. This study offers theoretical insights on mechanisms to improve patient-centered care through the use of the OPE. Significant practical implication of this research include helping hospital leadership with the decision of whether to invest in an OPE or not and how to structure their OPE.

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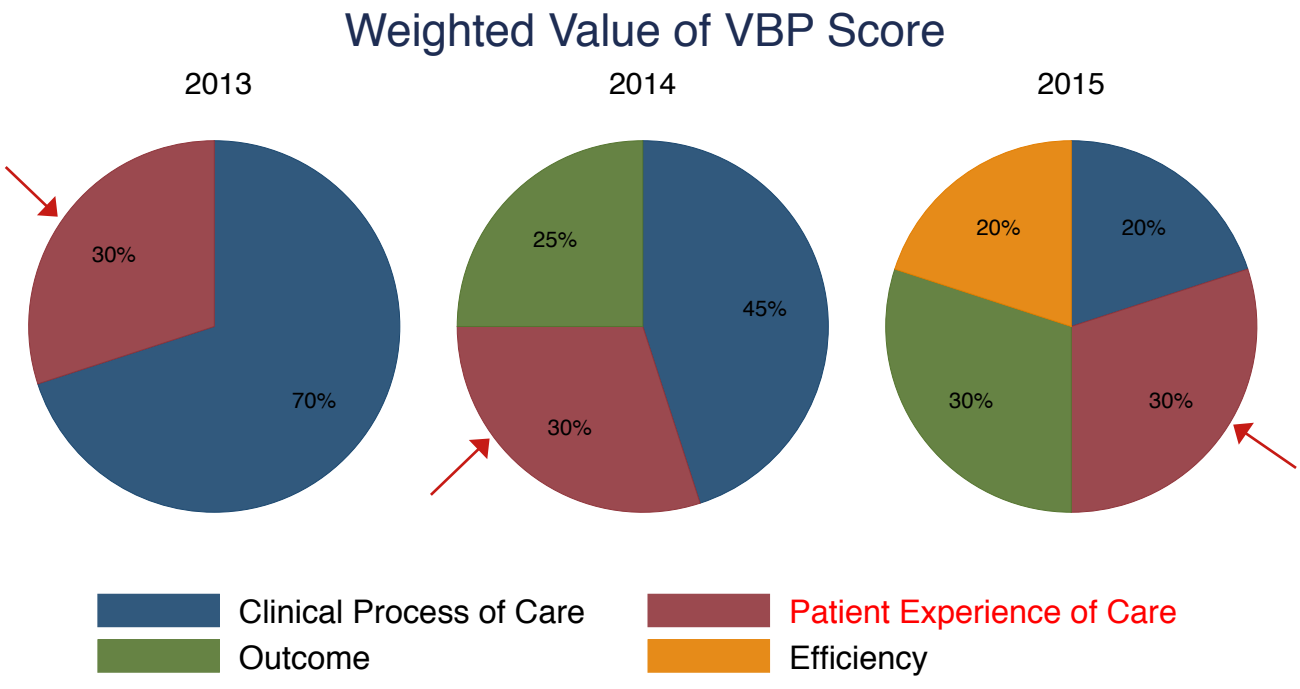
Chapter 1: Introduction

Background. Since the inception of the Patient Protection and Affordable Care Act (PPACA) of 2010, there have been significant changes in the delivery of healthcare (1). Payment reform was one of the key attributes of the PPACA, shifting the reimbursement model from fee-for-service (FFS) to value based purchasing (VBP) (2). Under the FFS model, physicians and hospitals were reimbursed by the number of procedures conducted rather than quality of care (2). Moreover, payments were unbundled and physicians were reimbursed for each medical procedure conducted. In this model, physicians and hospitals had an incentive to over-treat or perform unnecessary procedures to maximize payments received from the patient and payors. The FFS model has been attributed as one of the reasons for the increasing healthcare costs in the United States. In the VBP model, payments are bundled and reimbursement is based on patient outcomes (2-3). The adage for the VBP model is quality over quantity and excellence in health care delivery is rewarded under VBP (3). Since payments are bundled, the burden falls on caregivers to determine the most effective and efficient care for their patients (3). The VBP model was implemented in 2013 and initially the VBP score is comprised of 70% on clinical process quality & safety and 30% of the score is comprised of patient experience (3-4). The VBP model has evolved over the years to include patient outcomes and efficiency (3-4). However, patient experience of care has stayed stagnant at 30% of the overall score. The weighted domain of the VBP score is displayed in Figure 1. Patient experience of care is measured by the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey (4). These measures are quantifiable and beginning FY2013, the Centers for Medicare and Medicaid Services (CMS) started to utilize the HCAHPS survey to determine reimbursement rates as part of VBP payment model (4). Since patient experience is a significant portion of the VBP model

for reimbursement, HCAHPS scores can equate to millions of dollars in revenue for a hospital. Historically, hospitals have focused on improving their process of care measures through good process management practices (5). Changes in management practices include establishing centers of patient safety and quality and developing senior leadership positions for these centers. These changes in management practices have shown to improve clinical outcomes metrics such as readmissions and length of stay (6). However, these changes are associated with a decrease in patient experience because hospitals are biased towards evidence-based practices and less importance is given to patient experience (7-8). Moreover, a study found an inverse relationship between patient experience and complication rates (technical quality of care) (9). Since patient experience has become a vital component of the reimbursement model with payment reform, hospitals are taking initiatives to improve the patient experience dimension and raise their scores on HCAHPS surveys.



Source - CMS Hospital VBP Fact Sheet

Figure 1. Value Based Purchasing (VBP) model components from 2013-2015.

Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS). The HCAHPS survey started in 2006 to measure the patient's perspective of hospitals care (10). HCAHPS is a national survey conducted by CMS for all Medicare-qualified hospitals in the United States. Initially, the survey was designed to inform consumers (prospective patients) on how hospitals were judged by previous patients with regard to their hospitals stay. Beginning in FY2013, CMS started to employ the HCAHPS survey as part of the VBP model to incentivize hospitals to increase patient satisfaction and experience (10). HCAHPS surveys are completed by patients who are 18 years or older at the time of hospital admission and had at least one overnight stay in the hospital. The survey is conducted on a random sample of recently discharged patients. The timeframe to receive the survey varies from 48 hours to six weeks after the discharge. The survey is 32 questions and 25 of these questions inquire about different dimensions of patient experience, and 7 questions query about personal information about the patient (10). Figure 2 demonstrates some sample questions from the survey. Figure 3 represents the different dimensions of patient experience measured. These dimensions include critical aspects of the hospital experience (communication with nurses, communication with doctors, how responsive was the hospital staff to the patient, pain management, communication about medicines, discharge information, cleanliness of hospital environment, quietness of hospital floors during the night, overall experience during hospital stay, and willingness to recommend hospital to another patient). These dimensions are grouped into composite topics (survey questions related to communication), individual items (survey questions related to the physical environment of the hospital), and global items (overall rating of the hospital experience). HCAHPS survey scores are averaged for each hospital by CMS and are updated on a quarterly basis. HCAHPS scores are publically available on the CMS hospital compare website (10).

YOUR CARE FROM NURSES

2. During this hospital stay, how often did nurses listen carefully to you?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

YOUR CARE FROM DOCTORS

7. During this hospital stay, how often did doctors explain things in a way you could understand?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

THE HOSPITAL ENVIRONMENT

8. During this hospital stay, how often were your room and bathroom kept clean?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

YOUR EXPERIENCES IN THIS HOSPITAL

16. Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

WHEN YOU LEFT THE HOSPITAL

18. After you left the hospital, did you go directly to you own home, to someone else's home, or to another health facility?

1 ☐ Own home
2 ☐ Someone else's home
3 ☐ Another health facility

OVERALL RATING OF HOSPITAL

21. Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?

0 ☐ 0 Worst hospital possible
1 ☐ 1
2 ☐ 2
3 ☐ 3
4 ☐ 4
5 ☐ 5
6 ☐ 6
7 ☐ 7
8 ☐ 8
9 ☐ 9
10 ☐ 10 Best hospital possible

UNDERSTANDING YOU CARE WHEN YOU LEFT THE HOSPITAL

24. When I left the hospital, I had a good understanding of the things I was responsible for in managing my health.

1 ☐ Strongly disagree
2 ☐ Disagree
3 ☐ Agree
4 ☐ Strongly agree

Figure 2. Sample HCAHPS survey questions.

Figure 2. Sample HCAHPS survey questions.

Office of patient experience (OPE). Given the importance of HCAHPS scores and the shift to the VBP model, hospitals are taking initiatives to improve their performance on the HCAHPS survey. These initiatives include setting up an "Office of Patient Experience" (OPE) as a separate governing entity responsible for improving patient experience and satisfaction utilizing HCAHPS dimensions (11). The Cleveland Clinic was a pioneer in developing and effectively using an OPE. According to James Merlino (inaugural chief patient experience officer of the Cleveland Clinic), an OPE is a stand-alone department with its own full-time staff and budget. An OPE's sole purpose is to increase patient experience, and an OPE is different from an office of patient relations and an office of quality and safety. An OPE operates by conducting and analyzing patient surveys, interpreting patient complaints, administering the "voice of the patient", training employees, and coordinating with other departments in the hospital to identify and resolve issues regarding patient experience (11). Essentially, an OPE acts as an intermediary between patients and caregivers. An OPE delivers the voice of the patients to the caregivers, which results in a better experience for the patients. The Office of Patient Experience is generally tasked with developing and implementing optimal practices to ensure that hospitals consistently deliver patient centered care to improve patient experience. Slowly, an increasing amount of hospitals are developing OPE's across the country to enhance patient experience in their hospitals.

Purpose. The antecedents and drivers for patient satisfaction have not been clearly defined in the exiting literature (12). The aims of this project are to investigate the effects of having an office of patient experience (OPE) on experiential outcomes. In this multi-year observation study, we

hope to gain insights on the role of the OPE across all Medicare-qualified hospitals in the United States and their effects of patient experience. Our research questions (RQ) are the following:

Primary RQ – What is the effect of the office of patient experience on experiential outcomes as measured by the HCAHPS survey?

Secondary RQ – How does the background (clinician vs. non-clinician) of the executive in charge of the OPE impacts experiential outcomes and how should an OPE be structured?

Significance. To our knowledge, this is the first research study looking at the effects of having an office of patient experience. This study will offer theoretical insights on mechanisms to improve patient centered care through the use of the Office of Patient Experience. Significant practical implications of this research include helping hospital leadership with the decision of whether to invest in an OPE or not and how to structure their OPE's. Patient experience of care is a prominent topic in healthcare. A mutual relationship between hospitals and patients needs to be established because the synergy benefits both entities. If hospitals provide better experience to their patients', then in return patients' rate hospitals higher on the HCAHPS survey resulting in higher reimbursements (equating millions of dollars). This study helps determine if an OPE can help initiate this symbiotic perpetual cycle.

Chapter 2: Conceptual Framework

I conducted an extensive literature review on patient experience of care. Patient experience has become a prominent topic in healthcare recently; however patient experience was not considered as prominent during the initial deployment of the HCAHPS survey. According to Epstein et al. 2010, hospital boards did not prioritize quality of care as a top priority for board oversight (13). Recently, patient experience has become a top priority for hospitals after the implementation of the VBP model. Manary et al. 2015 conducted a survey assessing the relationship between organizational characteristics and publically reported HCAHPS scores (14). The study found that 68% of hospital boards and 81% percent of chief executive officers in the survey viewed patient experience as extremely important. On an interesting note, only 15% of physicians and 34% of nurses were supportive to improve patient experience of care (14). These results support the findings of Senot et al. 2016 that there is a lack of buy-in on the patient experience dimension. Since 2010, there have been numerous research studies measuring the changes in HCAHPS scores (15-17). However, there is limited empirical literature on how to improve HCAHPS scores. Since the development of the HCAHPS survey, physician communication on the HCAHPS survey has consistently scored the lowest across all hospitals (18). There many been intervention studies focusing on improving physician communication (19-21). However, these interventions are designed to improve only one dimension of the HCAHPS survey, but the survey encompasses nine other dimension that are equally as important to the patient experience of care. Davies et al. 2008 proposes that small measurable improvements in patient experience may be achieved over short projects (interventions); however sustaining more substantial change requires change in organizational strategies (22). Merlino et al. 2013 proposes the office of patient experience (OPE), which is an example of an organizational change that is solely focused

on patient experience. An OPE focuses on enhancing the communication between caregivers and patients. An OPE behaves as an intermediary between caregivers and patients, and is responsible for ensuring that the voice of the patient is perceived.

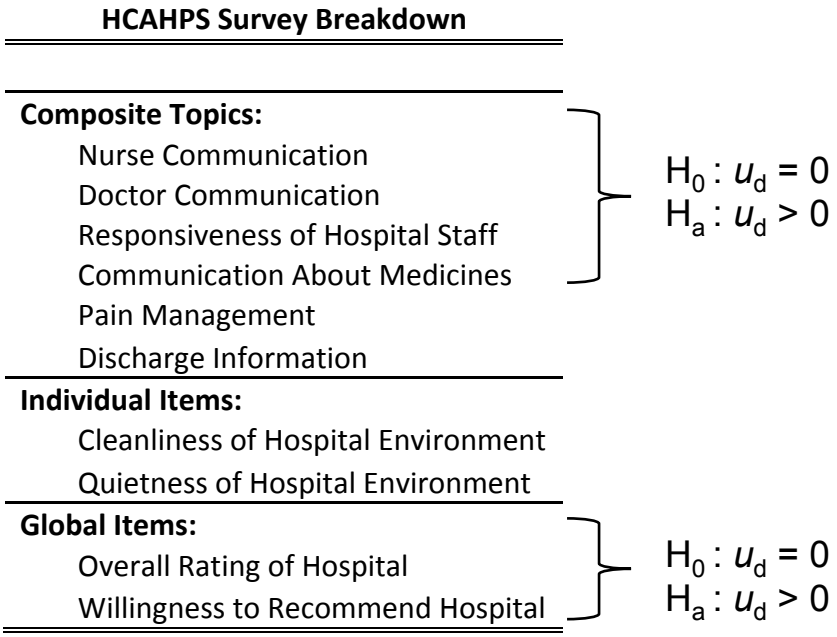


Figure 3. HCAHPS survey dimension.

Based on our literature review and our understating of how an OPE operates, we formulated the following hypotheses for our primary research questions:

Hypothesis 1a: Hospitals with an OPE will be associated with higher HCAHPS score for the composite topics related to communication between the patients and the caregivers.

Hypothesis 1b: There will be no difference between the HCAHPS scores related to the hospital environment between OPE and non-OPE hospitals.

Hypothesis 1c: Hospitals with an OPE will be associated with higher HCAHPS scores for the global items related to overall quality of experience.

Our secondary research question was concerned with the structural organization of an OPE. Empirically, we wanted to evaluate if clinicians (medical background) or non-clinicians

(business background) are better at leading an OPE. According to Epstein et al. 2008, hospitals with high nurse-staffing levels may be associated with better experiences for patients (23). Furthermore, Weiner et al. 1996 observed that physician involvement in hospital governance played a significant role in adopting total quality management. (24) Moreover, physician involvement in hospital governance improves communication among physicians, managers, and boards and builds trust between the clinical staff and administrators (24). The results from these studies suggest that clinicians are better equipped to handle issues regarding communication and providing better experience to the patients. Moreover, an OPE is a novel concept and according to Weiner et al. 1996, physician leadership involvement is integral in adopting new administrative innovations. In addition, clinicians are involved in communicating with patients on a daily basis based on the medical care provided. Non-clinicians lack the hands on interaction and interfacing with patients. An OPE leader who is a clinician may have better insights than non-clinicians on how to increase the HCAHPS scores based on the communication dimensions due to past experience interfacing with patients. On the other hand, non-clinicians are better trained to handle issues concerning the environment and quality of hospitals. Non-clinicians are trained to enhance the quality of hospitals while minimizing cost. The HCAHPS has multiple dimensions; both clinicians and non-clinicians can make an impact on a formation of an OPE due to their different skillset. Based on the literature review and the differing expertise of clinicians and non-clinicians, we formulated the following hypotheses:

Hypothesis 2a: OPE leaders with a clinical background will have higher HCAHPS score for the dimensions related to communication and interactions with patients.

Hypothesis 2b: OPE leaders with a non-clinical background will have higher HCAHPS score for dimensions related to hospital environment and overall experience of the hospital.

Chapter 3: Methodology

CMS Data. This study contained the use of secondary data as well as collection of primary data. The source of the secondary data was obtained through the CMS Hospital Compare database (25). The Hospital Compare database is a robust and comprehensive database containing information about the quality of care at over 4,000 Medicare-certified hospitals in the United States (26). The quality dimensions measured are timely and effective care, complications, readmissions, deaths, HCAHPS scores, payment, and value of care for each hospital. The data is compiled with the joint efforts of CMS, National Quality Forum, and the Agency for Healthcare Research and Quality (26). The database is updated annually for the preceding year. The primary use of the database is to inform patients about the hospitals where they are receiving or planning to receive treatment. However, the secondary use of the data for research purposes has assisted in making significant advances in healthcare research. We queried the database for HCAHPS scores and general hospital information for all Medicare-certified hospitals in the United States from the years 2008-2014. We amalgamated both data sources into an initial dataset that contained 4,991 hospitals across the fifty states. The hospitals were uniquely identified by their Medicare ID. The main type of hospitals consisted of general medical & surgical, academic, pediatrics, critical access, and other (eye, ear, nose & throat, cardiology, oncology, women's health, orthopedic, and long term acute care). In addition to the HCAHPS scores, we gathered information on number of beds, number of full time equivalence (FTE), case mix index (CMI), and total operating expense for each hospital from 2007-2014. CMI measures the complexity of medical cases seen by hospitals (26). Typically large hospitals observe more complicated cases resulting in a higher CMI. CMI is a good indicator when comparing different hospitals because similar CMI is a proxy of similar hospitals. Number of beds, FTE, and total operating expense

were recorded to determine the size of a hospital. HCAHPS scores were comprised from the dimensions of nurse communication, doctor communication, responsiveness of hospital staff, pain management, communication about medicine, discharge information, cleanliness of hospital environment, quietness of hospital, environment, overall rating of hospital, and willingness to recommend hospital. The overall integrated dataset consisted of 4991 hospitals from 2008-2014 resulting in 27,539 observations. Table 1 consists the summary statistics of the 4991 hospitals.

	Summary Statistics	
	Mean	SD
Hospital Type:		
Academic	0.0564	0.231
General	0.602	0.489
Pediatrics	0.0106	0.102
Critical Access	0.259	0.438
Other	0.0709	0.256
CMI	1.516	0.356
Total Operating Expense	124632356.757	170346124.328
Number of Beds	165.748	184.057
Number of FTE	848.905	1516.359
States	50	
Sample Size	4991	

Table 1. Summary Statistics for CMS integrated dataset. This table represents the characteristics of the hospitals in the dataset. Note – general hospitals in the table mean the hospital type general medical & surgical. Majority of the hospitals fall into the category general hospitals type with crucial access hospital being second. Academic and pediatric hospitals represent the smallest share of hospitals, but they are typically the largest hospitals. The average CMI for all of the hospitals in the dataset is 1.516, which represents the average complexity of medical cases observed by hospitals. For instance, if a hospital had a cmi of greater than 3, then the hospital is observing very complicated and complex medical cases. All of the states in the United States are represented in this dataset. HCAHPS scores for all ten dimensions were included for the hospitals in the dataset from 2008-2014.

OPE Data Extraction. While there is an abundant amount of public datasets available regarding hospital quality and HCAHPS survey scores, there is no curated dataset public or private that consists information on OPE for hospitals. To resolve this issue, we collected the data ourselves as our primary data collection initiative. Initially, we created a web scraping algorithm that would navigate through all of the hospitals websites and record information on the OPE's. The advantage of this method was the automation of the process and valuable time saved in the collection of the data. However no data collection process undergoes 100 percent seamlessness, and we experienced hurdles with our web scraping procedure. Majority of the hospitals have firewalls that block web scraping tools from gathering information. Moreover, we wanted to acquire demographic information on the OPE and the executive in charge. Specifically, we wanted to collect data on the following:

- Does the hospital have an office of patient experience?
- When was it formed?
- Who is responsible for the office?
- What is his/her designation?
- Other information about the office – (# of staff, mission statement etc)

The data on the preceding questions was unavailable on a single hospital website or not present at all. Since an OPE is a novel concept, majority of hospitals have not deposited extensive information on their websites. We had to expand our search to multiple websites such as LinkedIn or ResearchGate to gather all of the data desired. Since we faced these preceding complications with the web scraping methods, we turned to manual data collection and developed an inceptive data collection protocol for this study. The schematic of the protocol administered is displayed in figure 4, and this process was used to collect data for the 4991 hospitals listed in Table 1. First, a hospital website was located through the America Hospital Directory (AHD) with the use of the unique Medicare ID of each hospital (27). AHD was more

useful than a Google search because AHD stores updated information regarding hospitals. There have been numerous closings and mergers of hospitals across the country, and hospitals websites are not updated accordingly. AHD mitigated this problem by informing the user of closures or mergers of hospitals, so correct information was extracted. Next, a hospital of interest was opened through the links provided by AHD. Keywords including "Office of Patient Experience" and "Chief Patient Experience Officer" was queried through the hospital website. The results on the first two pages of the search engine were investigated to determine if the hospital had an OPE or not. This step was important because it was crucial that we recorded information on a stand-alone OPE. We wanted to avoid the scenario if hospitals were including patient experience as part of office of patient relations or office of patient safety. Our research question examines the affects of an OPE and not other departments on experiential outcomes. If an OPE existed in a hospital, we marked the hospital and explored further; if an OPE did not exist in a hospital, then we moved onto the next hospital in our database. The further inspection of the OPE included the questions mentioned in the previous page, in particular when the OPE was formed and the leadership demographics for the OPE. Majority of hospital websites were bleak in containing this information, so we explored websites such as LinkedIn and ResearchGate to acquire the additional data. If these additional websites rendered futile, then we called the OPE directly with the number listed on the hospital website. In this step, we faced one of the major limitations of our study. We discovered that some hospitals were unwilling to provide additional information on the OPE because of confidentially concerns. This limited the scope of the data because we needed the formation year of the OPE to conduct our econometric analysis, and the leadership demographics to answer our secondary research question. We recorded all of the information in our database, and moved onto the next hospital. After creation of the protocol, a pilot data

collection was conducted to determine efficiency and efficacy of the procedure. The protocol was efficacious, and the protocol was administered for the remaining hospitals. In the end, we progressed through all of the hospitals listed in Table 1, and created the first database containing information on the OPE for all hospitals in the United States. The data collected from our protocol was integrated with the CMS dataset.

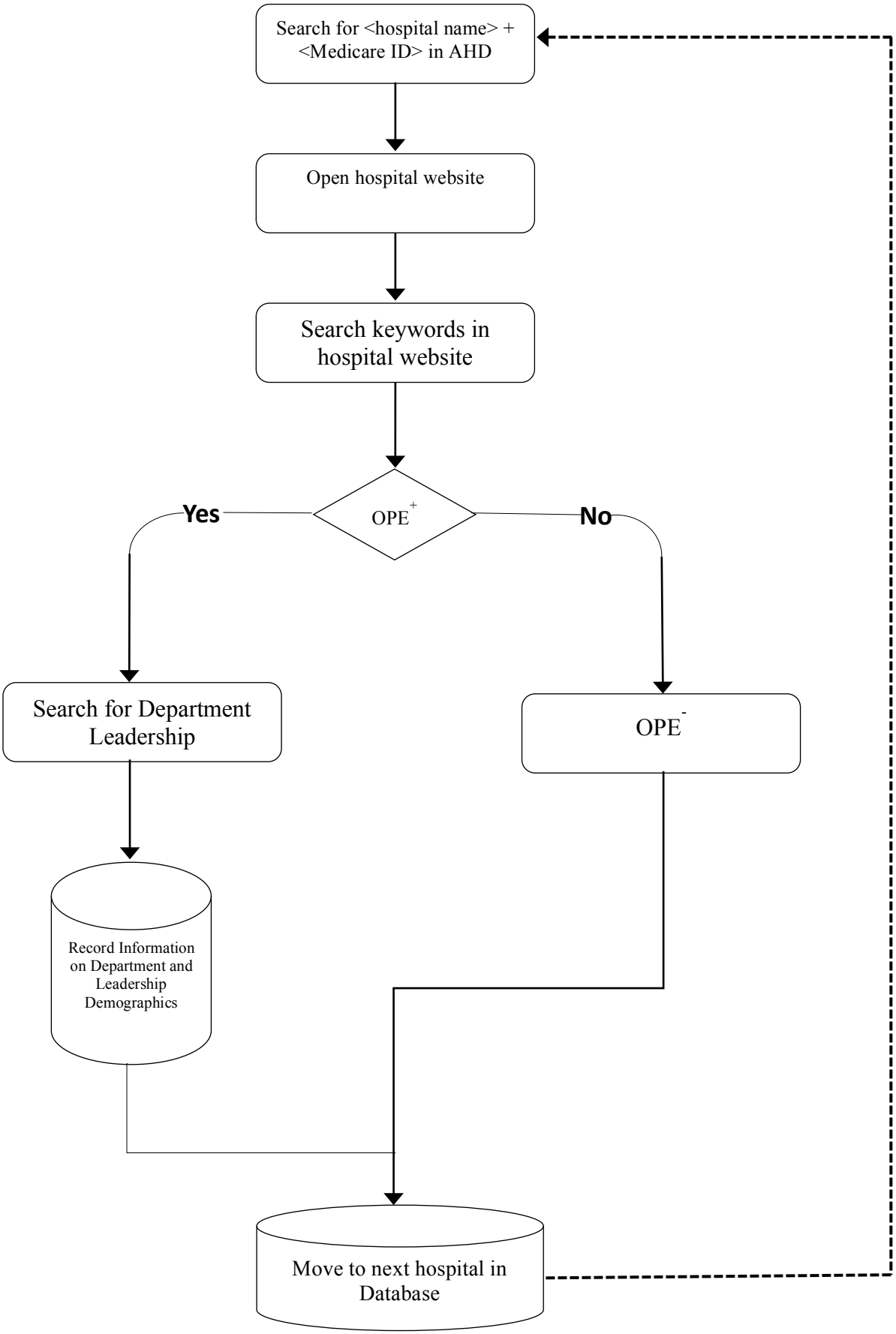
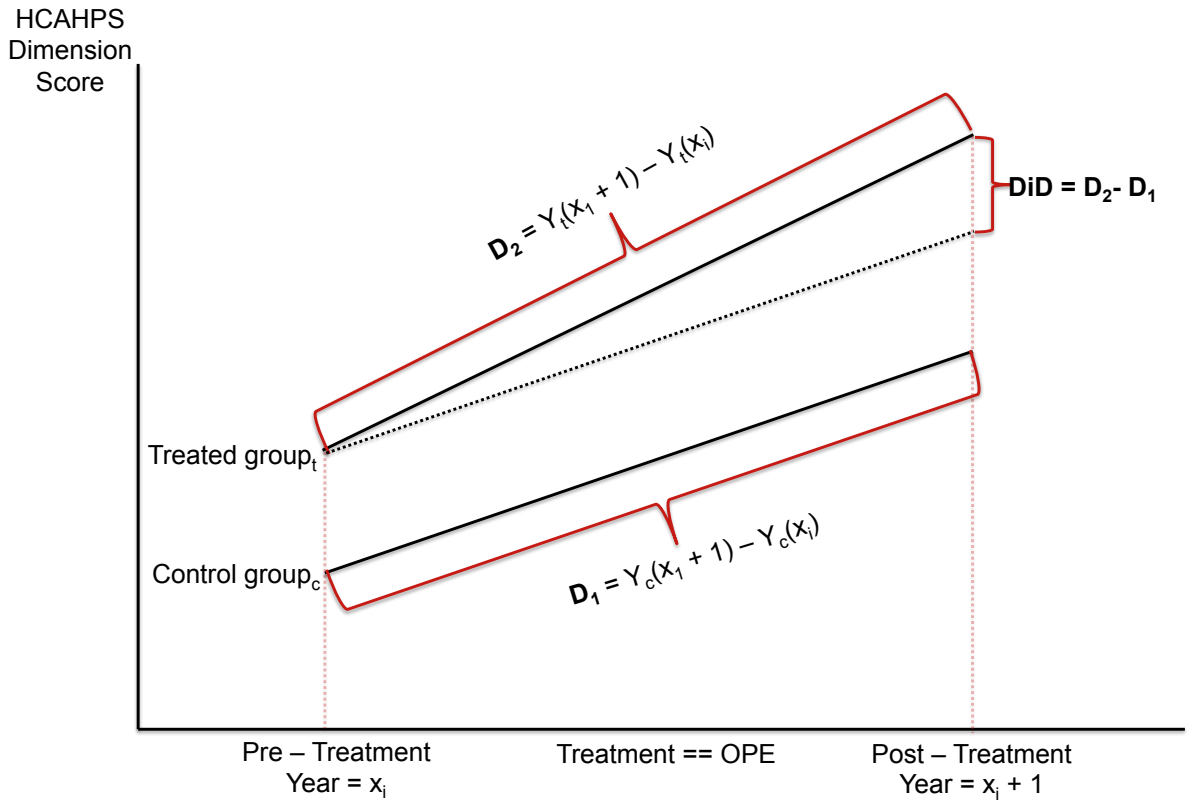


Figure 4. Schematic for OPE data extraction.

Data Analysis framework. We amalgamated the integrated CMS dataset and OPE data gathered form our extraction efforts. For hospitals containing an OPE, we further evaluated the OPE and determined if the OPE was a network OPE or a dedicated OPE. A network OPE is prevalent in network hospitals, in which one OPE is in charge of multiple hospitals. For instance, OhioHealth has many hospitals under its network (Riverside Methodist Hospital, Dublin Methodist Hospital, Grady Memorial Hospital, Grant Medical Center, etc.). If OhioHealth has one OPE that is in charge its entire network of hospitals, then we coded this scenario as a network OPE. We deciphered the existence of a network OPE if multiple hospitals in our hospital had the same OPE executive or chief patient experience officer. On the other hand, a dedicated OPE is stand-alone OPE for one hospital. A dedicated OPE has a sole obligation to one hospital. For our research study, we excluded hospitals with a network OPE because we wanted to reduce the endogeneity in our econometric analysis. We cannot determine accurate causal relationship between OPE and HCAHPS scores in a particular hospital if its OPE is responsible for other hospitals. We separated the amalgamated dataset based on if hospitals had a dedicated OPE vs. no OPE. Next, we administered our matching algorithm to match similar hospitals with an OPE vs. similar hospitals without an OPE. Our matching algorithm was based on the formation year of an OPE in a hospital, the hospital type, the state of the hospital, number of beds, and the case mix index (CMI). To be considered a similar hospital pair (hospital with an OPE and hospital without an OPE), a hospital pair had to match on all five of the matching criteria. Our CMS data contained information from 2008-2014 for HCAHPS scores, so it was imperative to figure out which years to compare. The formation year of the OPE was crucial in resolving this issue. For instance, if hospital X had an OPE formed in 2008, then we had to find a hospital Y (without an OPE) from 2008 to have a fair comparison. The percent change in HCAHPS scores for hospital

X (has an OPE) from 2008 to 2009 was compared to the percent change in HCAHPS score for hospital Y (does not have an OPE) from 2008 to 2009. After the year parameter was checked, we made sure hospital X and hospital Y were of the same hospital type. Our dataset contained ten different types of hospitals, so we confirmed that our matching algorithm correctly matched the same type. For instance, both hospital X and Y had to be academic, and it could not be the case that hospital X is academic, while hospital Y is general medical & surgical. The next parameter was both hospital X and hospital Y had to be from the same state, and the same concepts applied as mentioned above with hospital type. For the number of beds, we made a specification of ± 50 beds in the matching algorithm. This criterion was completed if the number of beds in hospital X was in the range of ± 50 with the beds in hospital Y. The final criterion was the CMI, which measures the complexity of cases seen by hospitals. We made a specification of ± 0.10 CMI in the matching algorithm. If the CMI in hospital X was in the range of± 0.10 with the CMI in hospital Y, this criterion was met. To reduce endogeneity in our econometric analysis and confirm that hospital X (has an OPE) and hospital Y (does not have an OPE) were similar hospitals, all of matching criteria had to be met in order to be considered hospital pairs. Figure 7 demonstrates the matching algorithm. I developed the program in the statistical software R to implement the matching algorithm for all of the hospitals in our database (28). The result was similar hospital pairs (hospitals with an OPE and hospitals without an OPE), in which econometric methods were employed to determine the significance in changes in HCAHPS scores between the hospital pairs.

Differences-in-Differences estimation.



$$\ln(Y_{HCAHPS}) = \beta_0 + \beta_1 x_{post-treatment} + \beta_2 x_{OPE} + \beta_3 x_{post-treatment*OPE} + \varepsilon$$

Figure 5. Differences-in-Differences (DiD) for OPE vs. non-OPE hospitals.

We employed a DiD strategy to determine the effects of an OPE on experiential outcomes. DiD estimation methods are prevalent in health economics because they measure the effect of policy change or treatment effect (29). Recently, a healthcare management paper measured the association between hospital organization and hospital operation costs utilizing DiD (30). I utilized this paper as guide to configure the econometric analysis in our study. DiD evaluates the impact of a treatment on an outcome by comparing the changes in the treated group vs. the changes in the control group (31). DiD reduces omitted variable bias by controlling for trend effects. Figure 6 demonstrates the concept of DiD graphically. In our research study, the treated

group was hospitals with OPEs, while the control group was hospitals without OPEs. Through our matching algorithm, we ensured that the control group and the treated group were similar hospitals. The only difference between the groups was the treatment, which was the introduction of an OPE (this only effected the treated group). The outcome measured was the percent change in the HCAHPS score between the formation year of the OPE and one year succeeding the formation year. The HCAHPS score consists of ten dimension resulting in the DiD employed ten instances. The pre-treatment variable was the HCAHPS score before the treatment was implemented for both the control group and the treated group. The post-treatment variable was the HCAHPS score after the treatment was implemented. In figure 5, D_2 is the difference in HCAHPS score for the treated group (hospitals with OPEs) after the treatment (introduction of an OPEs). For instance, if hospital X started an OPE in early 2008, then the pre-treatment year would be 2007 and the post-treatment year would be 2008; D_2 in this scenario is the difference in HCAHPS score between 2007 and 2008. This difference in HCAHPS score can be attributed to the introduction of the OPE (treatment) and other general trend effects. This causes endogenity because we cannot determine unequivocally if the introduction of an OPE caused the change in HCAHPS score. D_1 from figure 5 remedies this situation because D_1 is the difference in HCAHPS score for the control group (hospitals without OPE) after the treatment effects; however the control group did not receive the treatment. For example, hospital Y (control) which is similar to hospital X, but did not start an OPE. Following the previous example, D_1 would the difference in HCAHPS score between 2007 and 2008 for hospital Y (control – without an OPE), so the change in the HCAHPS score is solely attributed to the general trend effects because there was no introduction of an OPE for hospital Y. The DiD in figure 5 is the difference between D_2 and D_1. The DiD isolates the change in HCAHPS score due to the sole introduction of an OPE.

In the regression equation from figure 5, $\beta_3 x_{post-treatment*OPE}$ represents the coefficient that determines the effects of having an OPE vs. not having OPE on HCAHPS scores. We measured the percent change in HCAHPS score one year out from the formation year of an OPE in the treated group for the hospital pairs. We opted to use a log-level regression instead of a level-level regression because percent change is more informative in illustrating the effects of forming an OPE.

Ordinary least squares (OLS) regression.

$$Y_{\%\Delta \text{ in } D_2} = \beta_0 + \beta_1 x_{Bedsize} + \beta_2 x_{Clinician} + \beta_3 x_{Academic} + \varepsilon$$

Note: D_2 – Difference in HCAHPS score for hospitals with OPEs 1 year out

Figure 6. Ordinary least squares (OLS) estimation equation.

To answer our secondary research question of how to structure an OPE, we conducted OLS regressions to find causality between experiential outcomes and variables mentioned in figure 6. The regression equation in figure 6 evaluates the effects of hospital capacity (bedsize), clinician (this is a dummy variable if the OPE hospital executive has a medical background), and academic (this is a dummy variable if the OPE hospital is academic hospital) on change in HCAHPS scores (ten dimensions – ten regressions). The predicted sign on $ß_1$ for all ten regressions would be positive because larger hospital would allocate more money for an OPE resulting in higher HCAHPS scores. The predicted sign on $ß_3$ for all ten regressions would be positive because academic hospitals are typically large hospitals, and more money would be allocated for an OPE resulting in higher HCAHPS scores. The predicted sign on $ß_2$ would positive for HCAHPS dimensions relating to communication, while the sign would be negative

or zero HCAHPS dimensions relating to hospital environment and global categories. The purpose of this regression was to give us a preliminary outlook on how to structure an OPE. Lastly, we graphically investigated the difference in HCAHPS score between an OPE executive who is a clinician (medical background) vs. an OPE executive who is a non-clinician (business background) across the ten dimensions.

Chapter 4: Results

Data Extraction & Matching Algorithm results. The OPE data extraction protocol resulted in 851 hospitals containing an OPE and 4140 hospitals lacking an OPE. Figure 7 illustrates the results of the process in generating the hospital pairs. Out of the 851 hospitals with OPE's, 113 hospitals incorporated a dedicated OPE and 705 hospitals incorporated a network OPE. Hospitals with network OPEs were excluded from further analysis with the sole focus on analyzing the effects of a dedicated OPE. The dataset was sorted between a dedicated OPE (dummy variable coded as 1) and non-existence of an OPE (dummy variable coded as 0). Next, the matching algorithm was implemented to obtain similar hospitals between the two groups. The summary statistics for the result of the matching algorithm are presented in Table 2. The algorithm resulted in 32 hospitals with dedicated OPEs matching perfectly with 32 hospitals without OPEs. The hospital pairs were from 17 different states, which covered the five major regions (Northwest, Midwest, Southeast, Southwest, and West) in the United States. Due to strict matching criterions, only academic and general medical & surgical hospitals surpassed the threshold. The matched sample included 11 academic hospitals and 21 general medical & surgical hospitals. Furthermore, both sets of hospitals (OPE vs. No OPE) had similar CMI of 1.591 and 1.588, respectively. On the same note, both sets of hospitals had similar bed counts of 370.047 and 366.036, respectively. Overall, the matching algorithm was a success in identifying similar hospitals; however, not all of the hospitals with dedicated OPEs were included because of missing data from the extraction procedure or an incomplete match based on the 5 criterions (year, hospital type, state, number of beds, and CMI). Nevertheless, the sample size of 64 was sufficient to conduct the econometric analysis listed in Chapter 3.

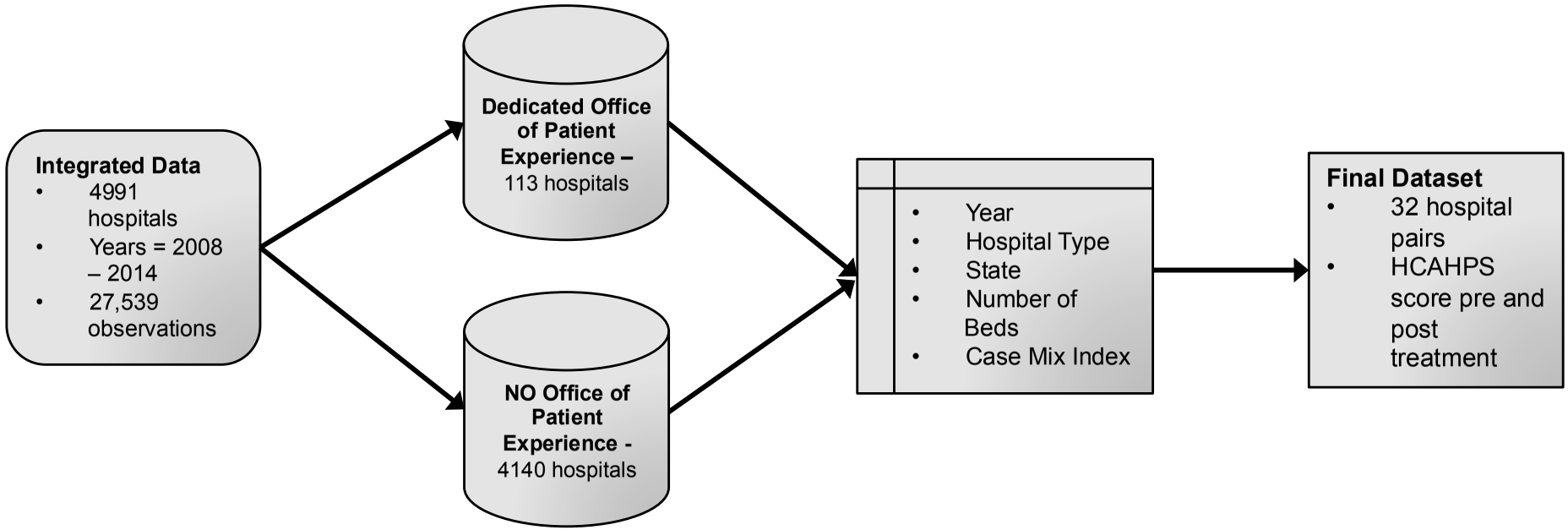


Figure 7. Algorithm for generating hospital pairs. We integrated the datasets containing general information on all Medicare-qualified hospitals from Hospital Compare – CMS and our primary data regarding OPE from our extraction efforts. Then, we sorted the data sets based on if hospitals had a dedicated OPE vs. no OPE. Next, we administered our matching algorithm which matched hospitals with OPE vs. hospitals without OPE based on hospital type (Academic, General Medical and Surgical, and Pediatrics), state, number of beds, case mix index (measures the complexity of cases seen by hospitals), and the year for HCAHPS survey conducted. The algorithm resulted in 32 hospital pairs based on the current integrated dataset.

	Summary Statistics	
	Mean	SD
Hospital Type:		
Academic (OPE)	0.343	0.482
Academic (Non-OPE)	0.343	0.482
General (OPE)	0.656	0.482
General (Non-OPE)	0.656	0.482
CMI (OPE)	1.591	0.323
CMI (Non-OPE)	1.588	0.322
Number of Beds (OPE)	370.047	247.541
Number of Beds (Non-OPE)	366.206	242.879
States (OPE)	17	
States (Non-OPE)	17	
Sample Size	64	

Table 2. Summary Statistics for matched hospital pairs. Our matching algorithm was efficient in identifying 32 hospital pairs. 32 hospitals without OPEs and 32 hospitals with OPEs were matched based on hospital type, CMI, number of beds, and states in which the hospital pair resided. Due to the matching criterion, only academic and general hospitals were able to pass the threshold. From the summary statistics, it is evident that hospital pairs generated are similar because the mean and standard deviation on the matching parameters are equal or proximal. The average cmi of ~1.59 between the hospital pairs is similar to the population average. On average, the hospitals in this sample are significantly larger than the population's average in terms of number of beds. This matches our hypothesis that larger hospitals tend to start an OPE because of their resources. Overall, our matching algorithm was efficient in generating hospital pairs.

	Dependent variable:		
	Control D1 (Post-Pre)	Treatment OPE D2 (Post-Pre)	Paired Difference D3 (D2-D1)
	(1)	(2)	(3)
Overall Rating	0.0117	0.0299	**0.018****
	(0.0096)	(0.0093)	(0.012)
Doc Comm	0.005	0.011	**0.0059**
	(0.004)	(0.005)	(0.007)
Nurse Comm	0.009	0.025	**0.016*****
	(0.006)	(0.005)	(0.007)
Received Help	0.011	0.030	**0.019***
	(0.011)	(0.008)	(0.015)
Explain Medicine	0.013	0.019	**0.0006**
	(0.013)	(0.006)	(0.014)
Pain Management	-0.0014	0.017	**0.019*****
	(0.008)	(0.007)	(0.008)
Quietness	0.021	0.042	**0.021***
	(0.008)	(0.016)	(0.015)
Cleanness	0.008	0.011	**0.0032**
	(0.006)	(0.008)	(0.011)
Hospital Recommend	0.0014	0.027	**0.026*****
	(0.009)	(0.009)	(0.0118)
Observations	32	32	32

Note: $^{*}p<0.10$ $^{**}p<0.05$ $^{***}p<0.01$

Table 3. Differences in Differences results. Since we had a small sample size, we manually conducted a paired *t* test to find the effects of having an OPE on HCAHPS scores. Also, we conducted the regression as mentioned in the methods, and the value for the $ß_3$ coefficient is the value for D3 in the table. All values listed in the table are in percents, so D3 represents the percent increase in HCAHPS scores for having an OPE for one year. All of the differences in HCAHPS scores in the table are calculated from one year out from the initial year of the OPE formation in a particular hospital for the treated group and the comparable non-OPE hospital for the control group. Note – the dimensions on discharge information is excluded from this table because both OPE & non-OPE hospitals endured a negative increase in this score one year out. This is indicative that hospitals need to focus on improving the information provided to patients' after their departure from the hospital.

Differences-in-Differences (DiD) results. The DiD results are summarized in table 3. Hospitals that formed an OPE performed better than the alternative on all dimensions of the HCAHPS survey, in which six dimensions were statistically significant. The results suggest that hospitals with OPEs are earning higher HCAHPS scores, which is noteworthy because higher HCAHPS scores are consistent with higher reimbursement rates from CMS. The largest increase was attributed to the dimension related to willingness to recommend the hospital to another patient. On average, hospitals with OPEs had a 2.6% higher increase in HCAHPS score than hospitals without OPEs ($p < 0.01$). Moreover, on average, hospitals with OPEs had a 1.8% higher increase in HCAHPS score than hospitals without OPEs for the overall rating of the hospital dimension ($p<0.05$). These results concurred with our hypothesis that hospitals with OPEs would have a higher increase in HCAHPS score related to the global items category. On average, hospitals with OPEs had an increase of 1.6% for nurse communication ($p < 0.01$); however, doctor communication only increased by 0.59% and was not statistically significant. According to Elliot et al. 2010 and Mann et al. 2016, doctor communication consistently accrued the lowest increase in HCAHPS score since the inception of the survey. One explanation for this phenomenon is that physicians value medical outcomes over patient experience. According to Manary et al. 2015, only 15% of physicians acknowledge that patient experience is an important dimension. On average, the score for responsive of hospital staff increased 1.9% for hospitals with OPEs over hospitals without OPEs ($p<0.1$). This result is consistent with the function of an OPE in which OPE personnel train hospital staff to response to patient needs in an efficient manner (Merlino et al. 2013). On average, explanation of medicine only had 0.06% increase (not statistically significant) in HCAHPS score between hospitals with OPE and hospitals without OPE. This result is in accord with an OPE's priority is to enhance patient experience rather than

clinical process of care (Merlino et al. 2013). On the other hand, hospitals with OPEs had a 1.9% increase in HCAHPS score related to pain management over hospitals without OPEs ($p < .01$). In addition, hospitals without OPEs endured a decrease in the pain management dimension. These results suggest that hospitals with OPEs are involved in the pain management process. The DiD results concur with our hypothesis that hospitals with OPEs performed better on the communication dimension of the HCAHPS survey. Finally, the DiD results for the HCAHPS dimensions associated with hospital environment was in contradiction with our hypothesis. We hypothesized that both sets of hospitals (OPE vs. non-OPE) will have similar scores for the hospital environment. The reasoning being that an OPE's main objective is to enhance communication and interaction between caregivers and patients rather than associating with cleanliness and quietness (Merlino et al. 2013). On average, our results demonstrate that hospitals with OPEs had an increase of 2.1% in the dimension of quietness over hospitals without OPEs ($p<0.1$). Since we controlled for general trend effects with the DiD, the result suggest that OPE is involved in maintaining the quietness of hospital floors. Lastly, scores for cleanliness of the hospital floors were 0.32% higher for hospitals with OPEs than hospital without OPEs (not statistically significant). The results disprove our second hypothesis and suggest OPEs are involved with the dimension pertaining to the hospital environment. The overall results from the DiD was in accordance with our primary research question that hospitals with OPEs are performing higher on HCAHPS scores than hospitals with OPEs.

Regression Results. The regression results as listed in table 4 help answer our secondary research question. The regressions were conducted to determine what factors are associated with higher HCAHPS scores in hospitals with OPEs. We regressed the size of the hospitals, if the hospitals was an academic hospital (omitted group being general medical & surgical hospitals),

and if the leader of the OPE was a clinician (omitted group being non-clinicians) on HCAHPS scores. We conducted ten regressions for each dimension of the HCAHPS survey. The results suggested that if an OPE leader is a clinician, holding constant size of the hospital and academic hospital, then the HCAHPS score for quietness increased by 8.181% at the 0.05 significance level. Along the same line, if an OPE leader is a clinician, holding constant size of the hospital and academic hospital, then the HCAHPS score for recommending the hospital to another patient increased by 5.743% at the 0.05 significance level. Our regression result suggest that OPE leaders who are clinician are better suited to improve the global and hospital environment dimension of the HCAHPS survey. The regression results were different from our theoretical framework because we hypothesized that clinicians would provide higher HCAHPS score in the communication dimension rather than the global and the hospital environment dimensions. Due to a small sample size, our regression model was not as robust as we expected.

Graphical results. The bar graph illustrated in figure 8 displays changes in HCAHPS scores depending on the background of the OPE leader in hospitals with OPE. OPE leaders who were clinician had a significantly higher increase in HCAHPS scores for cleanliness, quietness, and recommendation of the hospital to another patient. On the other hand, OPE leaders who were non-clinician had a significantly higher increase in HCAHPS scores for doctor communication, nurse communication, and explanation of medicine to the patients. The results were opposite from our theoretical framework because we believed that clinicians would be better equipped to increase communication scores since they directly communicate with the patients rather than non-clinicians. One explanation postulated was clinicians may need more time to adjust their role as leaders of the department to have a higher impact on the HCAHPS scores. The percentage change observed from these analyses our only one year out from the start of an OPE.

	Dependent variable:									
	Overall Rating	Doc Comm	Nurse Comm	Received Help	Explain Medicine	Pain Management	Quietness	Cleanness	Discharge information	Hospital Recommend
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bedsize	0.004	-0.001	0.001	-0.002	-0.004	-0.0001	0.003	0.003	-0.012	-0.0004
	(0.004)	(0.003)	(0.002)	(0.004)	(0.004)	(0.004)	(0.007)	(0.004)	(0.018)	(0.004)
Academic = 1	0.206	1.240	0.103	0.634	0.453	0.953	0.312	1.536	6.221	-0.043
	(2.314)	(1.414)	(1.293)	(2.229)	(2.073)	(1.959)	(3.787)	(2.019)	(9.636)	(2.103)
Clinician = 1	1.679	-1.400	-1.967	0.837	-3.416	1.140	8.181**	2.872	1.110	5.743**
	(2.417)	(1.477)	(1.350)	(2.328)	(2.164)	(2.046)	(3.955)	(2.109)	(10.063)	(2.196)
Constant	0.818	1.337	2.714**	3.376*	4.163**	1.226	1.023	-1.311	-6.363	1.690
	(1.985)	(1.213)	(1.109)	(1.912)	(1.778)	(1.680)	(3.248)	(1.732)	(8.266)	(1.804)
Observations	32	32	32	32	32	32	32	32	32	32
R^2	0.054	0.057	0.088	0.015	0.095	0.021	0.134	0.117	0.023	0.214
Adjusted R^2	-0.047	-0.045	-0.010	-0.091	-0.002	-0.084	0.041	0.022	-0.082	0.130
Residual Std. Error (df = 28)	5.430	3.318	3.033	5.231	4.863	4.596	8.885	4.738	22.609	4.935
F Statistic (df = 3; 28)	0.532	0.559	0.902	0.142	0.977	0.200	1.446	1.235	0.216	2.541*
Note:										*p**p***p<0.01

Table 4. OLS Regression Results. Then regression were conduction on the effects of hospital size (bedsize), clinician (medical background), and academic (hospital type) on each of the ten dimensions of the HCAHPS scores (communication with nurses, communication with doctors, how responsive was the hospital staff to the patient, pain management, communication about medicines, discharge information, cleanliness of hospital environment, quietness of hospital floors during the night, overall experience during hospital stay, and willingness to recommend hospital to another patient). The outcome measured is the percent increase in HCAHPS scores in hospitals with OPE. The regression was only conducted on hospitals with OPE. The values displayed are percent increases in HCAHPS scores.

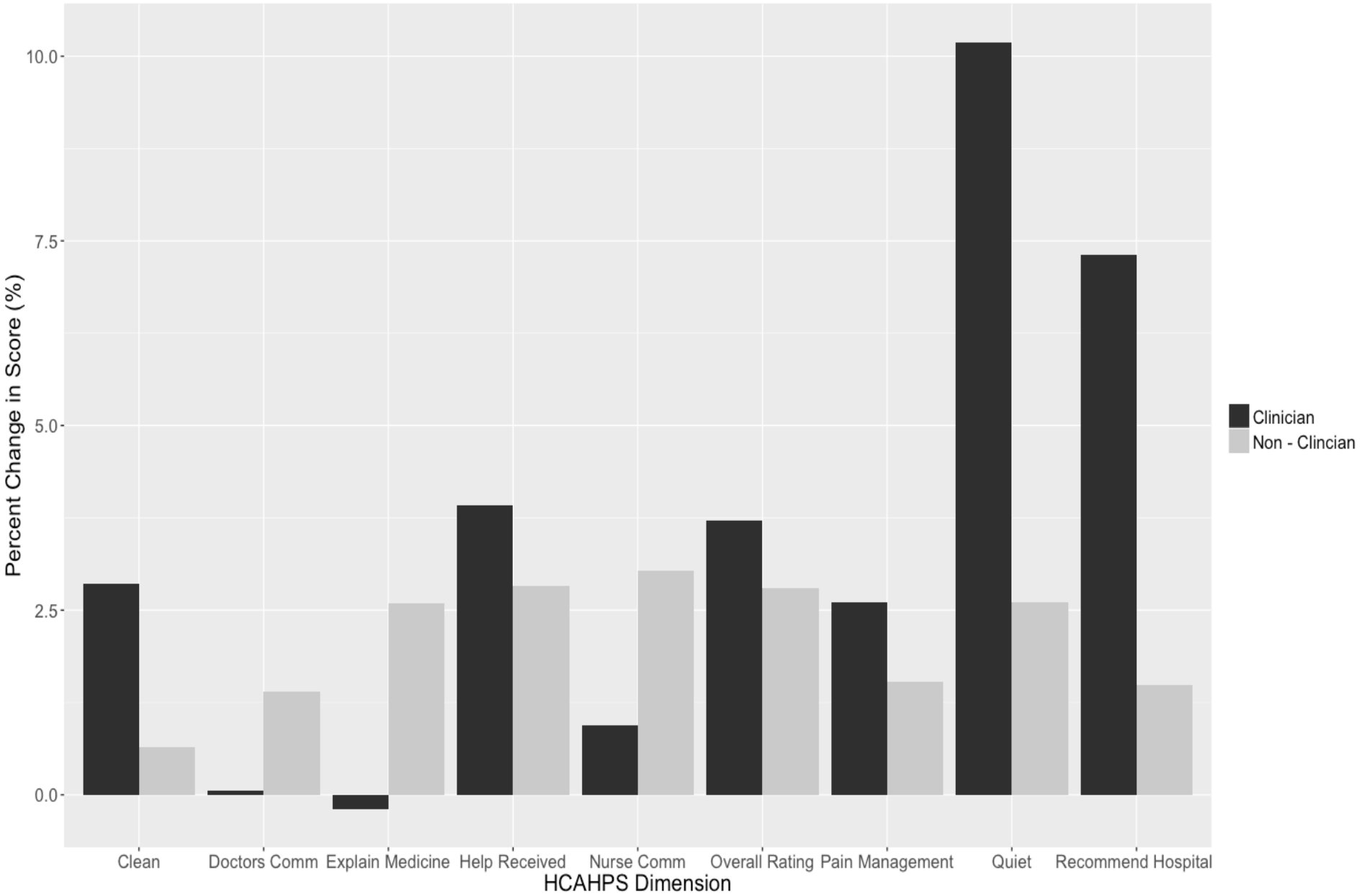


Figure 8. Percent change in HCAHPS score for clinicians vs. non-clinicians. To evaluate our secondary research questions of how OPE should be structured, we examined the difference in HCAHPS score between hospital leadership who were clinicians vs. non-clinicians in hospitals with OPE. The dependent variable measured was the percent change in HCAHPS score one year out from the inception of the OPE in a particular hospital.

Chapter 5: Discussion

The health care industry has historically been biased towards evidence-based practices and there is lack of buy-in on patient experience dimension (Levinson et al. 2010 and Senot et al. 2016). Given the importance of HCAHPS scores and patient experience, hospitals are employing multiple initiatives to enhance patient experience of care. Some hospitals are spending vast amount of money in ramping up the aesthetics of hospitals by building grandiose waiting areas, big screen TV's in patient rooms, elegant meals from chefs, room service, and other amenities typically found in the hospitality industry (Merlino et al. 2013). According to Merlino et al. 2013, hospitals are discovering that the preceding methodology to enhance patient experience is abortive. The reasoning being that CMS and HCAHPS survey is more interested to ameliorate the interactions between caregivers and patients, and not interested in the superficial amenities provided by hospital. Hospitals are beginning to realize this complication and have started to incorporate the "Office of Patient Experience" (OPE) as a separate governing entity responsible for improving patient experience and satisfaction utilizing HCAHPS dimensions. The literature supports the development of an OPE in hospitals. According to Davies et al. 2008, small measurable improvements in patient experience may be achieved over short projects; however sustaining more substantial change requires change in organizational strategies, engaged leadership, cultural change, regular measurement and performance feedback and experience of interpreting and using survey data. The mission statements of an office of patient experiences are in tandem with the conclusion of Davies et al. 2008. Moreover, Westphal et al. 1997 examined the theoretical framework on the adoption of administrative innovations. The authors concluded that in comparison to early adopter, later adopters of administrative innovation (Total Quality

Management in hospital) conformed more closely to the normative pattern of quality practices introduced by other adopting hospitals (32). The administrative innovation in our study is the introduction of an OPE in a hospital, and according to this study early adopters of an OPE will have an advantage because they can customize an OPE to best suit the needs of their hospital. The theories from the literatures are supported by our empirical work.

In this study, we evaluated the effects of having an OPE on experiential outcomes as measured by performance on the HCAHPS scores. To our knowledge, this is the first research study observing the effects on an OPE. We created the first database containing information on which hospital have started an OPE. We find that hospitals that have invested in an OPE have raised their HCAHPS scores higher than hospitals that did not invest in an OPE. Even though the percent increase in HCAHPS score are minute, a slight increase in HCAHPS score can equate to millions of dollars in reimbursements from CMS under the VBP model. Our differences-in-differences strategy provided valuable insights into the effects of having an OPE. OPE's were fruitful in increasing scores for all of the HCAHPS dimensions except for doctor communication, explanation of medicine, and cleanliness of hospitals. According to Manary et al. 2015 and Senot et al. 2014, physicians have disinclination towards patient experience and champion clinical process of care and medical outcomes. This is consistent with our results that physician communication scores had an insignificant increase in HCAHPS scores with an OPE. There are many studies in the literature observing how to improve physician communication scores. Banka et al 2015 conducted an intervention study with residents from different medical specialties to increase patient satisfaction, and the results of the intervention increased patient experience. In addition, Levinson et al. 2010 highlights the importance of communication interventions for

caregivers. In our opinion, OPEs should examine these research studies and fuse the models from the studies into their management practices to help increase physician communication scores. Our regression analysis and graphical analysis suggest OPE leaders with business backgrounds are better suited to handle communication dimensions while OPE leaders with a medical background are better equipped to handle the remaining dimensions.

There were several limitations associated with this study. Our OPE data extraction was hampered by some OPE departments refusing to provide information about their departments for confidentiality concerns. It is probable that the protocol (figure 4) administered to obtain classifications for OPE in each hospital was unable to yield 100% accuracy due to human error and hospitals masking description of OPEs on their website. This limited the scope of our dataset because we were unable to obtain crucial demographic information regarding the OPE. Due to this limited scope of data, the sample size for our econometric analysis was small. Also, we believe that HCAHPS surveys can be improved to provide more accurate views on patient experience. Tevis et al 2014 suggests that HCAHPS survey should include more variables regarding patient experience in order to evaluate patient satisfaction thoroughly. Lastly, our second research question requires a hands-on approach in coordination with our empirical findings.

Our future steps include conducting an experimental investigation into the management practice of an actual OPE. It is difficult to obtain a definitive answer of how to deploy a departmental structure and practice with secondary data. The regression results will be coordinated with an experimental investigation on management practices of an actual OPE under a clinician vs. a

non-clinician to better understand the structure of an OPE. This hands-on approach will allow us to understand how to structure an efficient OPE. Moreover, we will attempt to collect the missing data from our OPE extraction efforts. We plan to create an econometric model to incorporate network OPE's into our analyses, and understand the effects of a network OPE.

Optimizing patient experience is critical for both patients and hospitals. We propose that all hospitals should invest in an OPE because the benefits vastly outweighs the cost of starting an OPE. For instance, the Cleveland Clinic spent $9.2 million to start their OPE, and their HCAHPS scores increased dramatically (Merilno et al. 2014). The increase in reimbursements from CMS for the Cleveland Clinic resulting from the increase in their HCAHPS score is astronomical compared to their initial expenditures to initiate an OPE. Furthermore, Stein et al. 2015 finds that patient experience is generally correlated with the quality of care provided. There is an abundant amount of hesitation around the concept of change in the healthcare industry, buy by investing in an OPE and providing excellent patient experience, hospitals can benefit financially and provide exceptional quality of care simultaneously.

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